Appendix A: Clean copy of Amended Application

PRECISE LOCATION DATA PROVIDER

FIELD OF THE INVENTION

[0001] The present invention relates to the field of providing precise location data for 911 calls made from cell phones and from landline telephones connected to a PBX-type master switching box. More specifically, the present invention provides a method and apparatus to provide a landline telephone subscriber's ID proximate to a cell phone user or office phone user to a 911 Operator upon the user initiating a 911 call.

BACKGROUND OF INVENTION

[0002] When a 911 call is placed from a landline telephone, the address of the landline telephone is immediately displayed on the 911 operator's or public safety answering point operator's screen which occurs without verbal communication from the 911 caller. However, when a 911 call is placed from a cellular telephone, the caller's location does not show on the 911 operator's screen, and unless verbal communication takes place between the 911 operator and the caller, the location source of the 911 call (and therefore, the caller) is not passed along to the 911 operator. In other cases, although the caller is able to communicate with the 911 operator, the caller may be unable to provide the operator with the caller's current location. Accordingly, all cell phones are at a disadvantage when contacting emergency 911 operators relative to contact from a landline telephone.

[0003] The Federal Communications Commission (FCC) in the United States has mandated that cell phone carriers must automatically provide the location of 911 calls made from a cell phone to public safety answering points within certain accuracy parameters (specifically, within 50 meters 67% of the time and within 100 meters 95% of the time). Failure to provide precise location data of the caller's location may place the caller's life in jeopardy, which is why the FCC has set high standards. For example, police officers responding to GPS or TDOA type location data might have to search dozens or even hundreds of apartments or offices before finding the precise location of the 911 caller since such technologies give a latitude/longitude reference to the 911 call, which may, depending on the terrain, building structure and signal attenuation, provide a reference point which may be several hundred feet from the location of the 911 call.

[0004] Several companies are trying to satisfy the FCC requirement by using Global Positioning Signal (GPS) or Time Distance of Arrival (TDOA) between cell towers to provide location data. These technologies are achieving only limited success in consistently providing accurate location data in urban areas and in rural settings sometimes missing the actual caller's location by several hundred feet.

Companies using these technologies experience even less success accurately locating the caller when the caller is in a building where the cell phone's signal is shielded. This creates many difficulties as cell phones are often used in residences, apartments and office towers, warehouses, factories and schools.

[0005] When a 911 call is made from a landline telephone in an office that is connected to the landline via a PBX type master switching box then only the street address appears on the 911 operator's screen which also makes obtaining the caller's precise location challenging. For example, a 911 call placed from a landline on the 35th floor of an office tower will only reveal the office tower address to the 911 operator. The 911 operator would only know that the call was placed from the 35th floor (and specifically office no. 3526) if the caller spoke with the responding 911 operator.

[0006] This presents difficulties as, in many cases such as sudden illness, armed robbery or assault, the caller can dial 911, but is unable to speak with the 911 operator (or may not know or remember the address). The lack of precise location data provided to the 911 operator in such a situation may put the caller's life in jeopardy. Another example is personnel working alone. Such personnel would benefit from technology that would allow them to surreptitiously contact and provide a 911 operator with their current location data. Since in many instances an overt call for help could trigger a violent reaction from an actual or potential aggressor, being able to contact a 911 operator without alerting the actual or potential aggressor could be life saving.

[0007] Due to the difficulties associated with providing 911 operators with precise location data from cell phones and office phones in the circumstances described above, it is desirable to provide a system and method for providing more precise location data to a 911 operator without requiring the caller to verbally communicate location data with the 911 operator.

BRIEF SUMMARY OF THE INVENTION

[0008] It is an object of the present invention to overcome the disadvantages of the prior art by providing a system and method for consistently providing accurate location data to a 911 operator when a 911 call is made from a cell phone or a landline connected to a PBX type master switching box.

[0009] The present invention in various embodiments includes a transmitter and corresponding receiver (or a set of transceivers) and a pre-dialler connected to the receiver or one of the transceivers which is capable of transmitting a signal encoded with precise location data to a 911 operator.

[0010] In one embodiment the present invention provides a 911 operator with the precise address of an incoming 911 call made from a cellular telephone. More specifically, the present invention provides a system and method for sharing the nearest telephone company subscriber's identification, already imbedded into subscribers' landline telephone system, with a 911 call to provide the 911 operator with the precise location of the 911 caller. That is, when a 911 phone call is made from an enabled cell phone

which is proximate to an enabled landline telephone or an enabled phone jack, an interaction is initiated between the cell phone and the landline telephone which ultimately provides the 911 operator with the subscriber identification for the landline telephone which provides precise location data.

[0011] In a further embodiment, the present invention provides the precise location of a 911 call placed by a landline telephone connected through a PBX-type master switching box using a similar system and method.

[0012] In still further embodiments, various arrangements, systems and methods for using the transmitter and corresponding receiver (or set of transceivers) and pre-dialler are taught.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Embodiments of the present invention will now be described by way of example only, with reference to the attached Figures wherein:

[0014] FIG. 1 is a schematic showing transmission from enabled cell phone to enabled landline telephone wall jack in accordance with the present invention.

[0015] FIG. 2 is a schematic showing transmission (by transceiver) from cell phone to landline telephone wall jack in accordance with the present invention.

[0016] FIG. 2A is a schematic showing a sequence of transmission from an enabled wall jack and line telephone to an enabled cell phone and then relayed to cell tower in accordance with the present invention.

[0017] FIG. 3 is a schematic showing a converted landline telephone dialling sequence (911) initiating a transmission to an enabled junction box in accordance with the present invention.

[0018] FIG. 4 is a schematic showing a lone worker activating a triggering key, the resulting transmission being received at an enabled wall jack or landline telephone in accordance with the present invention.

[0019] FIG. 5 is a schematic showing a lone worker activating a triggering key, the resulting transmission being received by a cell phone and subsequently relayed to an enabled wall jack/line telephone in accordance with the present invention.

[0020] FIG. 6 is a schematic showing a lone worker activating a triggering key from an office building containing a PBX-type master switching box and the transmission resulting from activation of the triggering key being received by enabled junction box circuitry in accordance with the present invention.

[0021] FIG. 7 is a schematic showing a stand-alone unit in communication with a vehicle communication system in accordance with the invention.

[0022] FIG. 8 is a flow diagram showing a method for providing precise location information using the system provided in FIG. 1 in accordance with the present invention.

DETAILED DESCRIPTION

[0023] Generally, the present invention provides a system and method for providing accurate location data to a 911 operator when a 911 call is made from a cell phone or from a landline telephone which is connected to a PBX type master switching box.

[0024] In a general embodiment, the system 100 includes a transmitter 41 capable of broadcasting a triggering signal 2 for receipt by a corresponding receiver 43 (or, alternatively, a pair of transceivers or a suitable combination of transmitters, transceivers and receivers). The receiver 43, in turn, activates a predialler 50 which is capable of transmitting a second or call signal to a 911 operator where such second signal is encoded with identifying information which is convertible (or automatically converted) by a 911 operator into precise location data.

[0025] In one embodiment as shown in Figures 1 and 8, the system 100 provides a subscriber's identification from a landline telephone nearest to a cell phone making a 911 call. In this embodiment, the cell phone 1 has a transmitter 41 for transmitting a triggering signal 2 to the nearest landline telephone 3 or phone jack 4. The landline telephone 3 or phone jack 4 is equipped with a complementary receiver 43 for receiving the triggering signal 2 and the landline telephone 3 is further equipped with a pre-dialler 50. Predialler 50 is a device capable of completing a telephone call and in this embodiment is used for initiating a 911 call to a 911 operator. Upon receiving the triggering signal 2 from the cell phone 1 (which transmission is initiated upon a 911 call being initiated by the cell phone 1), the receiver 43 activates the predialler 50 which completes a 911 call. When the 911 operator receives the call from the predialler 50, the 911 operator is provided with the subscriber information for the landline telephone 3 which can be easily converted by the 911 operator (or is automatically converted for the 911 operator) into precise location data for the caller.

[0026] A worker skilled in the art will appreciate that receiver and predialler 50 may be installed and linked to the phone jack or installed in a phone jack or wall outlet box, thereby alleviating the need for a landline phone 3.

[0027] In this embodiment, the transmitter 41 is integrated with the cell phone 1 either by adding an interface module (not shown) to the cell phone 3 or building the transmitter 41 into the cell phone's chipset. Further in this embodiment, the landline telephone's circuitry may integrate the receiver 43 and pre-dialler 50. A worker skilled in the art will appreciate that software installed on the cell phone circuitry may alleviate the need for a separate transmitter in the cell phone.

[0028] Another embodiment of the present invention, shown in Figures 2 and 2A, involves installing a first transceiver 91 in a cell phone 1 or interface module (not shown) which is activated when the cell phone user dials 911. The transmitted signal 2 is received by a second transceiver 10 in a nearby landline telephone 3. The transceiver 10 is imprinted with the subscriber ID in a signal 14 that is returned and decoded by the transceiver 91. The subscriber data is then transmitted via signal 15 from the cell phone 1 to either the cell provider where it is switched to the public safety answering point or directly to the public safety answering point for decoding to obtain precise location data of the cell phone user.

[0029] The cell phone embodiments will work in any location within cell phone range of a cell tower and will also work where normal cell phone transmissions are blocked, out of range, or in areas not serviced by a cell phone network. Under these circumstances, it is necessary only for the cell phone 1 to transmit a signal 2 to an enabled landline telephone 3.

[0030] In a similar embodiment as that shown in Figures 2 and 2A, the system could be used to locate lost or abducted children. More specifically, a transceiver 91 is sewn into a child's clothing or other apparel or in any other innocuous place where it would not be tampered with by the child and where it would avoid detection. Upon the child becoming lost or being abducted, a parent or guardian would initiate a signal to transceiver 91 from a transmitter (not shown). Transceiver 91, encoded with a unique identifier for the child, would in turn transmit a signal which would be received by the nearest enabled landline telephone 3, phone jack 4 or cell phone 1 which would in turn initiate a 9-1-1 call providing precise location data which would enable rescuers to find the child.

[0031] In another embodiment shown in Figure 3, the present invention provides specific office location data from a landline telephone 3 within an office building to a 911 operator where otherwise the 911 operator would merely receive the particular office building's street address. More specifically, in this embodiment, a bypass circuit 78 is installed such that it bypasses the PBX type master switching box 79 and terminates directly at a junction box 18 for the office. The bypass circuit 78 includes the imbedded 911 location data. A desk phone or other landline telephone 3 includes a transmitter 41 which communicates with a receiver 43 which may be installed at the office junction box 18. Upon a user dialling 9-1-1 from the landline telephone 3, the landline telephone 3 transmits a triggering signal 2 which is received by the receiver 43 at the junction box 18. This activates a pre-dialler 50 which in turn places a 9-1-1 call with the 911 location data through the bypass circuit 78. When the 911 operator receives the call from the pre-dialler 50, the 911 operator is provided with the 911 location data and is therefore provided with precise location data for the caller. The 911 operator will also receive a call processed through the PBX-type master switching box 79 but will be able to compare approximate address locations and the timestamps for the two calls to eliminate the redundant call received directly from the landline telephone 3 call being processed through the PBX-type master switching box 79.

[0032] In a further embodiment, a 9-1-1 call initiated by a cell phone 1 made from within an office building may have its signal 2 intercepted by a nearby landline telephone 3 or phone jack 4 which is attached to a bypass circuit 78 and includes a transmitter 41 for communicating with a receiver 43 located in the office junction box 18. Accordingly, the landline telephone 3 would transmit a triggering signal 2 to the office junction box 18 which would, upon the receiver 43 triggering a pre-dialler 50 also located at the office junction box 18, complete a call to a 911 operator, such call including the specific office location of the landline telephone 3 and therefore providing the 911 operator with precise location data for the cell phone caller.

[0033] In a further embodiment, the present invention may be used by a lone worker 19 to surreptitiously make a 911 call through the use of a triggering key 20. The triggering key 20, which may look like any commonly worn item, includes a transmitter 41 for sending a triggering signal 2 to a cell phone 1 (Figure 5) or landline telephone 3 (Figure 4) or phone jack 4 (not shown) which is enabled with a transceiver 10 (in the case of a cell phone) or a receiver 43 and predialler 50 (in the case of a landline telephone 3) to ultimately communicate precise location data to a 911 operator. Upon receiving the triggering key's signal, the cell phone 1 receives signal 2 and transmits signal 2 via transceiver 10 to the nearest receiver 43 for further handling. In the case of a landline telephone 3 or phone jack 4 receiving the signal from the triggering key 20, the receiver 43 activates pre-dialler 50 to place a 911 call complete with precise location data.

[0034] In a still further embodiment, shown in Figure 6, the triggering key 20 may communicate directly with a receiver 43 which would then cause a pre-dialler 50 to send the subscriber's identification information or the precise office location to a 911 operator.

[0035] A worker skilled in the art will appreciate that a lone worker 20 in the above embodiments may be a senior citizen, handicapped individual or someone otherwise unable to reach a phone in an emergency. This would allow such an individual to freely roam their home or other facilities enabled with receivers 43 and prediallers 50 without concern about carrying a cell phone or being proximate to a phone or other people if emergency assistance is required.

[0036] Another embodiment of the invention entails packaging a transceiver 10 with imbedded location data in a small robust stand-alone unit 61. This stand-alone unit 61 (hardwired or battery powered) can be placed in various desirable locations such as underground parking garages, elevators and other locations where placing a landline telephone or phone jack would be difficult or conspicuous or set up in a city wide grid pattern to react to a cell phone 911 call in the same manner as the embodiments described above. The stand-alone unit 61 could also be attached to a landline and carry the necessary imbedded location data and initiate a 911 call upon reception on a triggering signal 2 from a cell phone,

triggering key or other device. This embodiment provides advantages of portability and alleviates the need to have an enabled landline telephone.

[0037] In a more specific embodiment shown in Figure 7, circuitry within a vehicle (such as those found in vehicle communication systems) would be capable of transmitting a triggering signal 2 to the stand-alone unit 61 having transceiver 10 such that the vehicle communication system having transceiver 91, which would normally be inoperative in a parkade or other covered area, would be able to communicate precise location data via signal 15.

[0038] In any of the above embodiments, and in the event that more than one enabled landline responds to the 9-1-1 call, the 911 operator can dismiss duplicate receptions by comparing location data of various cells and the timestamps of various calls. This function could also be handled automatically by software designed for this purpose. Similarly, redundant regularly-received 9-1-1 calls such as call 5 from cell phone 1 shown in Figure 5 can be identified and ignored by the 911 operator.

[0039] In any of the above embodiments transmitting subscriber identification to the 911 operator, it should be noted that the subscriber identification may include the subscriber's name and address. Alternatively, the subscriber's identification could be shown as the subscribers telephone number, in which case the 911 operator will check the telephone number to determine the subscriber's name and address.

[0040] In any of the above embodiments, the present invention will not interfere with the normal function of either cell or landline telephone systems and will not interfere with the usual transmission and reception of cell phone placed 911 calls.

[0041] In any of the above embodiments using a cell phone, a worker skilled in the art will appreciate that a PDA with cellular capabilities, Blackberry™ or any other comparable handheld or portable device may replace the cell phone.

[0042] A worker skilled in the art will appreciate that the landline can be substituted with any mode of communication used to contact a 911 operator and should not be read to limit the present invention to conventional phone line use. Without limiting the generality of the above statement, the landline may include cable television, fibre optics, satellite, ADSL, electrical lines, voice-over-IP or other technology capable of transmitting an encoded signal to a 911 operator and may include intermediate steps such being directed through a number of servers, routers, switches or similar directing devices necessary to complete the communication to the 911 operator.

[0043] Likewise, the term "landline telephone" will be understood by one skilled in the art to include not just conventional switched telephone sets, but any transceiver for voice communications over landline, as noted above.

[0044] A worker skilled in the art will appreciate that the triggering signal 2 sent from any of the transmitters or transceivers to any of the corresponding receivers can be radio frequency (RF) based or other wireless signal such as Bluetooth™. In the case of a Bluetooth™ signal, the signal can be transmitted through connected Bluetooth™ devices to reach an enabled landline telephone or enabled phone jack, thereby extending the effective range of the Bluetooth™ signal.

[0045] A worker skilled in the art will appreciate that the system 100 can work in conjunction with and in parallel with prior art assisted GPS or TDOA systems. In particular, for rural, remote or open areas, a cell phone 1 may include a GPS chip to provide location data as an appropriate receiver 43 may not be available or proximate. This may prove to be especially useful in the embodiment described above with the lost or abducted child who may not be in the vicinity of a receiver 43.

[0046] A worker skilled in the art will appreciate that in any of the above embodiments, a transceiver could replace a transmitter or receiver.

[0047] A worker skilled in the art will appreciate than in countries outside of North America a different emergency code than 9-1-1 may be used. Accordingly, a worker skilled in the art will appreciate that all references to 9-1-1 may be replaced with another emergency code to account for regional, state or geographical differences.

[0048] The above-described embodiments of the present invention are intended to be examples only. Alterations, modifications and variations may be effected to the particular embodiments by those of skill in the art without departing from the scope of the invention, which is defined solely by the claims appended hereto.